Finance: how and under what terms savings/money are allocated between lenders and borrowers.
Financial contracts/securities: funds transferred from borrowers/issuers to lenders/ investors.
securities, corporate law, financial institutions and markets.
Financial System:
①primary provider of funds: (households)
②Financial/Market Intermediaries: transform nature of securities they issue and invest in banks, trust companies, credit unions, insurance firms, mutual funds.
Annuities: simply help make markets work by matching investors & issuers Investment dealers, Brokers (Investment Advisors)
③Government, Business, Non-residents

Time Value of Money

1.※**Time Value of Money**: money invested today has more value than the same amount invested later. (Money received today can be invested to earn a return; Inflation reduces purchasing power)
※Money: ability to buy goods and services. (medium of exchange(facilitate transactions), no value in and of itself)

※**Opportunity Cost/Alternative Uses**: what produce time value of money.(invest this dollar to earn a return)
OC of money: interest rate/price of money

2.**Simple Interest**: interest paid/received on the initial/original investment (the principal). (not earned on accrued/earned interest) $Value(time\ n) = P + n \times P \times k$
P:principal n: number of periods of the investment
k: market (interest) rate, required rate of return, discount rate

3.**Compound Interest**: interest earned on the principal amount invested and on any accrued interest
①compounding(future value) $FV_n = PV_0(1+k)^n$
FV: future value at time n PV:present value today(at time 0)
Compound Factor $(1+k)^n$: compound value interest factor (CVIF)
※Reinvest: keep interest earned on an investment fully invested
②discounting(present value): find PV of a FV by accounting for time value of money
discount factor $1/(1+k)^n$: compound value interest factor(PVIF). <1 (future dollars worth less than the same dollars today) PVIF=1/CVIF
③Internal Rate of Return: (IRR: rate of return internal to the values in the problem)
④Holding Period,Time: $n = \ln(FV / PV) / \ln(1+k)$

4.※**Annuities**: regular payments/receipts(**cash flows**) on an investment that are for the same amount and are paid at the same interval
Cash Flows: the actual cash generated from an investment
Ordinary Annuities: equal payments made at the end of each period

compound value annuity formula(CVAF) $FV_n = PMT\left[\frac{(1+k)^n - 1}{k}\right]$

present value annuity formula(PVAF) $PV_0 = PMT\left[\frac{1-1/(1+k)^n}{k}\right]$

PMT: regular end-of-period annuity payment/receipt

Annuities Due: for which payments are made at the beginning of each period (lease).

FV/PV of annuity due: $FV(annuity\ due) = [FV(ordinary\ annuity)](1+k)$

CVAF(1+k): $FV_n = PMT\left[\frac{(1+k)^n - 1}{k}\right](1+k)$ PVAF(1+k): $PV_0 = PMT\left[\frac{1-1/(1+k)^n}{k}\right](1+k)$

※**Perpetuities**: special annuities that provide payments forever (n->∞) $PV_0 = PMT/k$

investing-early scenario (common stock, preferred stock)

Growing/Shrinking perpetuities/annuities: $PMT_n = (1+g)PMT_{n-1}$

①perpetuities: $PV_0 = \frac{PMT_0(1+g)}{(1+k)} + \frac{PMT_0(1+g)^2}{(1+k)^2} \ldots \frac{PMT_0(1+g)^\infty}{(1+k)^\infty} \xrightarrow{k>g} \frac{PMT_0(1+g)}{k-g} = \frac{PMT_1}{k-g}$

②annuities: $PV_0 = \frac{PMT_0(1+g)}{(1+k)} + \ldots \frac{PMT_0(1+g)^n}{(1+k)^n} = \frac{PMT_1}{k-g} \times \left[1 - \left(\frac{1+g}{1+k}\right)^n\right]$ g: constant growing rate per period

5.Payments are made/received at intervals other than annually(annual rate):

※**Effective** Period **Rate**: the rate at which a dollar invested grows over a given period.

(usually state in percentage terms based on an annual period)

Effective (Annual) Rate: $k = \left(1 + \frac{QR}{m}\right)^m - 1$ QM:quoted/stated (annual) rate m:#of compounding intervals per year

Compounding conducted on a continuous basis: $k = e^{QR} - 1$

Effective semi-annual rate(compounded twice a year)=QM/2 Effective monthly (12 times/year) rate=QW/12

Effective Rate (for any period): $k = \left(1 + \frac{QR}{m}\right)^{\frac{m}{f}} - 1$ f: frequency of payments per year(f=1,annual ER, f=12 monthly ER)

6.※**Mortgage**: a loan, secured by real property, that involves "blended" equal payments(interest+principal repayment) over a specified payment period

※**Amortize**: retire a loan over a given period by making regular payments.(at the end of loan term, balance due/principal outstanding will equal zero)

Amortization Schedule: find k, then PMT then...					
Period	**Beginning Principal Outstanding**	**PMT**	**Interest** (accrued during this period n)	**Principal Repayment**	**End Principal Outstanding**
1,2..n	total loan	constant	BPO×k	PMT-interest	BPO-PR
N	(N-1) period EPO	constant	k=Effective Period Rate		0

Term (of a loan): period for which investors can "lock in" at a fixed rate

Amortization Period: period over which the loan is to be repaid/amortized.

Early payment goes toward interest versus principal reduction.

Timeline helps to visualize problem

Bond Evaluation & Interest Rates

Debt Instrument:
Bill/Paper: short-term bonds, with a maturity of less than one year(Money Market (Treasury Bills, commercial paper) (classified by Term to Maturity)
Notes: maturities between 1 and 7 years
Bonds: long-term debt instruments that promise fixed payments (maturities longer than7y)
Default: failure to pay bonds 违约

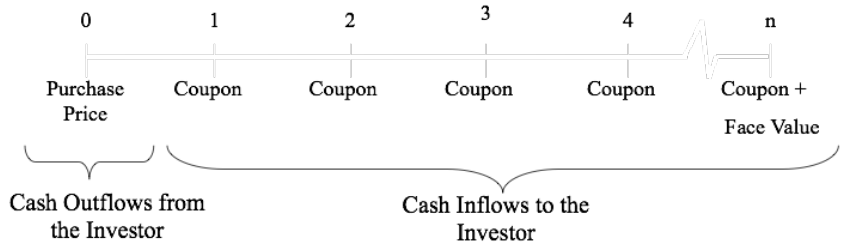
1.※ **Bond**: issuer agrees to pay the bondholder(investor) a regular series of cash payment and to repay the full principal amount by the maturity data.
※ **traditional "coupon-paying" bond**: bond provides for identical interest payments at regular intervals with full principal to be repaid at the stated maturity date (fixed income securities)
※ **bullet/balloon payment**: principal payment is made in one lump sum at maturity
bond indenture: legal document specifying payment requirements and all other salient matters related to a particular bond issue, held and administered by a trust company
collateral: assets that can serve as security for the bond in case of default
※ **Par/Face/Maturity Value**: (fixed) amount that is paid at maturity for traditional bonds
par value of most bonds: $1000(Minimum denomination) bond prices are quoted on a par value of 100. (bond price quoted 99, then a $1000 par value bond sell for $99)

※ **Term to Maturity**: time remaining until the maturity date
※ **interest payment/coupon**: fixed coupon rate (annual basis)×bond par value. (In CA, coupon are paid semiannually= (CR/2)*ParValue) (tax-deductible expense)
※ **mortgage bond**: debt instruments secured by real assets
※ **debenture**: unsecured or secured by a general floating charge over the company unencumbered assets(those assets have not been pledged as security for other debt obligations) e.g government bonds (no specific security is pledged as collateral)
※ **collateral trust bond**: secured by a pledge of other financial assets(common shares,T-bills)
※ **equipment trust certificate**: secured by equipment (assets pledged as security are owned by investors until loan retired)
※ **Protective Covenant**: in trust indenture, restrict actions of issuer
Negative Covenant: prohibit certain actions(limits on dividends payment, no pledge assets to other lender)
Positive Covenant: actions that the firm agrees to undertake(provide regular financial statements, maintain certain working capital level)

2.Bond Valuation:

$$B = I \times \left[\frac{1-1/(1+k)^n}{k}\right] + F \times \left[\frac{1}{(1+k)^n}\right] = I \times PVAF + F \times PVIF$$

B: bond value/price F:face/par value n: term to maturity(time left until maturity) k: periodic bond discount rate/ market (interest) rate I: interest/coupon payments=coupon rate(based on annually)×F



Purchase/Market Price of a bond = present value of the cash inflows, discounted at the bond YTM.

Discount(cr<k)/**Premium**(cr>k): difference between bond par value and the price it traded at, when it trades below/above par value.

Bond Price-Yield Curve:

bond prices - when interest rate +

time to maturity +, bond prices more sensitive to change of market rates

※ **interest rate risk**: sensitivity of bond prices to changes in interest rates

(high IRR: longer-term bonds with lower coupon rates and lower market yields)

※ **duration**: measure of irr (approximate percentage change in the price of a bond for a given change in the appropriate market interest rate) duration+, sensitivity+

Bond Quotes

bid price 出价 asked price 要价

$$Cash\ Price(actual\ price) = Quoted\ Price + Accrued\ Interest$$

$$Accrued\ Interest = Par\ Value \times Coupon\ Rate \times (days / 365)$$

※ **Yield to Maturity**:(YTM) discount rate (annual basis)

※ **Yield to Call**: yield associated with a bond first call date (flexible maturity dates, bonds are callable by issuer)

$$B = I \times \left[\frac{1 - 1/(1+k_c)^c}{k_c}\right] + CP \times \frac{1}{(1+k_c)^c}$$ CP: call price c: first call

※ **Current/Cash/Flat Yield**: ratio of annual coupon interest and current market price $CY = \frac{Annual\ Interest}{B}$

Price-Yield Relationship:

Bond Price--par (coupon rate=CY=YTM) discount(cr<CY<YTM) premium(cr>CY>YTM)

3.Interest Rate:

base interest rate

※**Nominal Interest Rate**: rates charged for lending today's dollars in return for getting dollars back in the future, without taking into account purchasing power of future dollars.

Fisher Effect:

※**Risk/Default-Free Rate**(RF)=real rate(of return)+expected inflation rate

Note: rate of return on risk-free investments, often used as base interest rate.

4.

①Treasury Bill: short-term government debt obligations that mature in one year or less.(no regular coupon but sold at discount from par value)

$$P = \frac{F}{(1 + k_{BEY} \times \frac{days}{365})}$$

$$k_{BEY} = \frac{F - P}{P} \times \frac{365}{n}$$

k:bond equivalent yield n:term to maturity(#of days)

In US, bank discount yield $k_{BDY} = \frac{F - P}{F} \times \frac{360}{n} \times 100$

②Zero Coupon Bonds(Zero): $B = F \times \frac{1}{(1+k)^n}$

Note: usually semi-annual discounting period; but quoted yield/YTM annual basis.

③Floating Rate Bonds(floaters): adjustable coupons that tied to some variable short-term rate.

④Real Return Bonds: issued by government of canada that provide investors with protection against inflation.
⑤Canada Savings Bond(CSB): issued by government of canada that have no secondary market and cant be traded, prices dont change over time.(cashed out by owner at full par value+accrued interest)

Equity Evaluation

Equity Instrument/Security:ownership interests in an underlying entity(corporation).
no fixed maturity date, equities pay dividends from after-tax earnings (no tax deductible expense) but shareholders pay lower taxes on dividends
※ **Common Stock**: certificate of ownership in a corporation. (most common type)
N common shares own (100N/total number of common shares outstanding) percent of corporation.
Residual Claimants: common shareholders are entitled to income remaining after all creditors and preferred shareholders have been paid. Liquidation of corporation, common shareholders are entitled to remaining assets after all other claims have been satisfied. Power to Vote: control over company
※ **Preferred Stock**: for the owner a claim to a fixed dividend rate that is established when shares are first issued. no voting rights
Valuation of Equity Securities:

2.**Preferred Share**: no maturity date and pay dividends of a fixed amount at regular intervals indefinitely (fixed income investment, perpetuities)
$P_{ps} = D_p / k_p$ P:present value/market price D:dividend amount/payment=stated par value×stated dividend rate
Note: preferred shares trade at par when k=dividend rate

3.**Common Share**:
①**Dividend Discount Model(DDM)**: common shares are valued according to present value of their expected future cash flows.
(estimated) $P_0 = \frac{D_1}{(1+k_c)^1} + ... \frac{D_n}{(1+k_c)^n} + \frac{P_n}{(1+k_c)^n}$ P_0:estimated share price today
D_n:expected dividend at the end of year n P_n:expected share price after n years
Price today is present value of all future dividends to be received(today to infinity) $P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k_c)^t}$
②**Constant Growth DDM**: g: annual constant growing rate
$P_0 = \frac{D_0(1+g)^1}{(1+k_c)^1} + ... \frac{D_0(1+g)^\infty}{(1+k_c)^\infty} \xrightarrow{k>g} \frac{D_0(1+g)}{k_c - g} = \frac{D_1}{k_c - g}$ only future estimated cash flows and estimated growth in these cash flows are relevant
Inputs of Constant Growth DDM: (increase) ①profitability--D1,g (+) ②base level of interest rate(RF)&risk premium--k_c(-)
Sustainable Growth Rate: (earnings/dividends) $g = b \times ROE = (1 - dividend\ payout\ ratio) \times ROE$
b: firm earnings retention ratio(earnings reinvested in the company)=1-dividend payout ratio
$Return\ On\ Equity = \frac{Net\ Income}{Common\ Equity} = \frac{Net\ Income}{Sales} \times \frac{Sales}{Total\ Assets} \times \frac{Total\ Assets}{Equity} = Profit\ Margin \times Asset\ Turnover \times Leverage\ Ratio$
leverage ratio + (higher debt)

Growth Opportunities: $P_0 = \frac{EPS_1}{k_c} + PVGO$ EPS:expected earnings per common share in the upcoming year PVGO:present value of growth opportunities. $EPS_n = (1+g)EPS_{n-1}$

③ Multiple Stage Growth DDM:

$P_0 = \frac{D_0}{(1+k_c)^1} + ... + \frac{D_t}{(1+k_c)^t} + \frac{P_t}{(1+k_c)^t}$ where $P_t = \frac{D_{t+1}}{k_c - g}$ (constant growth period after t)

4.Value Shares (by multiples):

①**Price to Earning ratio**: P.E=Market Price per share/Earnings per share

$P_0 = Estimated\ EPS_1 \times Justified\ P.E\ Ratio = EPS_1 \times P_0.E_1$

leading PE ratio: based on expected future earnings EPS1

lagging PE ratio: based on earnings over previos 12 months EPS0

②**Markt to Book ratio**: M.B=Market Price per share/book value per share

Book Value per share=books value of equity(i.e total assets-liabilities)/common share outstanding

③**Price to Sales ratio**: P_0=Sales per share×justifiable P.S ratio

④**Price to Cash Flow ratio**:

Cash Flow=net income+depreciation&amortization+deferred taxes

⑤Market value to EBIT/EBITDA:

EBIT: earnings before interest and taxes EBITDA: earnings before interest,taxes and D&A

Project Evaluation--Capital Budgeting & Risk Consideration

※ **Capital Expenditure**:(capex) firm investment in long-lived assets, tangible(PPE) or intangible(research, patent, development, copyrights, brand names, franchise agreements).
※ **Capital Budgeting**: process through which a firm makes capital expenditure decisions by identifying investment alternatives; evaluating alternatives; implementing chosen investment decisions; monitoring and evaluating implemented decisions.

1.Investment Alternatives:

①**Net Present Value**(NPV): present value of expected cash flow net of costs needed to generate them. Net incremental benefits the project is forecast to bring to shareholders. sum of present value of all future after-tax incremental cash flows generated by an initial cash outlay, minus present value of investment outlays;

$$NPV = \sum_{t=1}^{n} \frac{CF_t}{(1+k)^t} - CF_0$$

CF_t: estimated future after-tax incremental cash flow at time t CF_0:initial after-tax incremental cash outlay k: appropriate risk-adjusted after-tax discount rate(firm after-tax marginal cost of capital)
NPV>0, increase value of firm, project accepted, PV of expected future cash flows>cash outlay today

$$Increase\ in\ Share\ Price = \frac{NPV}{Number\ of\ Shares\ Outstanding}$$

②**Internal/Economic Rate of Return**(IRR): discount rate that makes Project NPV equals to zero

$$\sum_{t=1}^{n} \frac{CF_t}{(1+IRR)^t} = CF_0$$

accept project: IRR>appropriate risk-adjusted discount rate;firm cost of capital k
Mutually Exclusive Projects: acceptance of one project precludes acceptances of alternative projects
Crossover Rate: profiles cross over and have the same NPV at one special discount rate (crossover rate)
Note: discount rate k - NPV profile 交点 的k值. firm cost of capital k>Crossover Rate, choose A, or choose B

③**Payback Period**: number of years required to fully recover the initial cash outlay associated with capital expenditure.
Discounted Payback Period: number of years required to fully recover the initial cash outlay in terms of discounted cash flows.
④**Profitability Index**(PI): Discounted Cash Flow approach to evaluate capex decisions

$$Profitability\ Index = \frac{PV(cash\ inflows)}{PV(cash\ outflows)}$$

accept project PI>1

2.Independent and Interdependent Projects:
※ **Independent Project**: projects that have no relationship with one another; accept one project has no impact on the decision to another project.
※ **Interdependent Project**: projects are related, accept/reject one has an impact on the value if other projects under consideration
※ **Contingent Project**: projects for which the acceptance of one requires the acceptance of another, beforehand or simultaneously. Note: consider total NPV
※ **Mutually Exclusive Projects**: a firm choose among alternatives
Compare mutually exclusive project with unequal lives:
①**Chain Replication Approach**: find a time horizon into which all the project lives under consideration divide equally, then assume each project repeats until it reaches this horizon
②**Equivalent Annual NPV**(EANPV): find NPV of individual projects and the determine amount of an annual annuity economically equivalent to NPV generated by each project over its respective time horizon.

$$EANPV = \frac{Project\ NPV}{\left[\frac{1-1/(1+k)^n}{k}\right]}$$

n: project time horizon bracket: PV annuity factor for an n-year annuity

3.**Capital Rationing**: capital budget constraints(inefficient market)

Cash Flow Estimation,Capital Budgeting Decision

2.

①**Initial After-Tax Cash Flow**(CF_0): total cash outlay required to initiate an investment project

$$CF_0 = C_0 + \Delta NWC_0 + OC - PVCCATS$$

C_0: initial capital cost of asset(can be depreciated for tax purposes)

ΔNWC: change in net working capital requirements OC: PV of opportunity costs associated with project

PVCCATS:present value of Capital Cost Allowance tax shields(depreciation tax shield=depreciation deduction×tax rate)

②**Expected Annual After-Tax Cash Flow**(CF_t): $CF_t = CFBT_t(1-T) + CCA_t \times T$

CFBT: cash flow before taxes;incremental pretax operating income

CCA: CCA expense T:firm marginal/effective tax rate

③**Ending/Terminal After-Tax Cash Flow**(ECF_n):

$$ECF(with\ tax\ implications) = SV_n + \Delta NWC_n - [(SV_n - C_0)\times T] - [(SV_n - UCC_n)\times T] \approx SV_n + \Delta NWC_n$$

ECF: ending cash flow in year n(at the end of project life)

SV:estimated salvage value in year n for asset purchased

ΔNWC: net working capital “released” upon termination of the project.

C0:original capital cost of asset UCC_n: asset ending UCC balance

$$NPV = PV(Future\ CFs) - CF_0 = PV(Annual\ CFs) + PV(ECF_n) - CF_0$$

④

$$PV(operating\ cash\ flow) = CFBT \times (1-T) \times \left[\frac{1-1/(1+k)^n}{k}\right]$$

$$PV(CCA\ Tax\ Shield) = \left[\frac{C_0 dT}{k+d}\right] \times \left[\frac{1+0.5k}{1+k}\right]$$

asset held indefinitely

T:tax rate d:applicable CCA rate k:firm discount rate

$$PV(CCA\ Tax\ Shield) = \left[\frac{C_0 dT}{k+d}\right] \times \left[\frac{1+0.5k}{1+k}\right] - \frac{SV_n dT}{k+d} \times \frac{1}{(1+k)^n}$$

asset planned disposal

Disposal Value is Salvage残值 Value at t=n

$$PV(Capital\ Gains\ Taxes\ Paid) = \frac{(SV_n - C_0)T}{(1+k)^n}$$

$$NPV = PV(Operating\ CFs) + PV(CCA\ Tax\ Shield) + PV(ECF_n) - PV(Capital\ Gains\ Taxes\ Paid) - CF_0$$

Expansion Projects: projects add sth extra to the firm(sales,cost savings)

①Replacement Projects: replacement of an existing asset with a new one

$$NPV = PV(\Delta Operating\ Cash\ Flows) + PV(\Delta CCA\ Tax\ Shield) + PV(\Delta ECF_n) - \Delta CF_0$$

$$PV(\Delta CCA\ Tax\ Shield) = \left[\frac{(\Delta C_0)dT}{k+d}\right] \times \left[\frac{1+0.5k}{1+k}\right] - \frac{(\Delta SV_n)dT}{k+d} \times \frac{1}{(1+k)^n}$$

②Projects with Uncertainty:

Real Options: right to make a particular business decision after project has been initiated.
(only the ones increase project NPV: expand;suspend operations; invest in more research; delay production)
Traditional/Static NPV: analyses ignores managerial flexibility of embedded options, it will often undervalue certain projects and strategies
Dynamic NPV: Expand production if the project is more successful than anticipated; Abandon the project if the results are much worse than expected
decision tree: $NPV_{project} = NPV_{good} \times Probability_{good} + NPV_{ok} \times Probability_{ok} + NPV_{bad} \times Probability_{bad}$
The greater the uncertainty in outcomes, the greater the value in retaining flexibility

Lease Agreement: Lessee pays the lessor for the right to use an asset in return for payment.
①Operating Lease: some benefits of ownership are not transferred to the lessee but remain with the lessor.

②Financial/Capital leases: essentially all of the benefits of ownership transfer to the lessee

③Sale and leaseback (SLB) agreement: owner of an asset sells it to another party and then leases the asset back from them

	Operating Lease		Financial Lease	
	Lessee 出租人	Lessor	Lessee 承租人	Lessor
Asset	not on BS; disclose in notes of FS	on BS	on BS	Not on BS
Lease Payment	expense full amount as rental expense	rental income	decompose into interest and principal repayment;expense the interest portion	claim interest portion of payments received as interest income
Depreciation Expense	no claim	claim	claim	no claim

Lease or Buy: $1,000 to buy, depreciated at $100/year, sold in five years for $500, 5-year operating lease $140/year, effective tax rate 40%, before-tax cost of borrowing 7%.
use after-tax cost of borrowing to discount: discount rate=borrow rate×(1-T)=7%(1-0.4)=4.2%
①Buy: tax saving=0.4×$100=$40/year PV of depreciation tax saving=$40[1-1/(1.042)^5]/0.042=$177
PV of $500 salvage value=$500/(1.042)^5=$407 PV of buying=purchase price-PV depreciation savings=PV salvage value=$415
②Lease: after tax lease payment=$140×(1-0.4)=$84/year PV of after tax lease payments=$387

Lease Motivation: cheaper financing, reduce risks of asset ownership (resale & obsolescence); implicitly fixed interest rates; Maintenance;Convenience & Flexibility;Capital budget restrictions; Financial statement effects

※**Cost of Capital**: how a firm finances its invested capital

$S = \frac{X}{K_e}$ X:forecast earnings S:value of perpetuity

K: required rate of return for equity, cost of equity capital to the firm

Asset Turnover Ratio: Sales/Total Assets
Return On Assets(ROA): net income/total assets
Return On Capital(ROC):
Return On Invested Capital(ROIC): EBIT/book value(BV) of equity
Return On Equity(ROE): net income/book value of equity

$EPS = \frac{NetIncome}{\#Shares} = \frac{NetIncome}{Equity(BookValue)} \times \frac{Equity(BookValue)}{\#Shares} = ROE \times BVPS$ (book value per share)

K_e: required return of equity investors, firm earnings are perpetual and firm uses only equity financing: Price per Share $P = \frac{EPS}{K_e} = \frac{ROE \times BVPS}{K_e}$

※ Cost of Capital: **Weighted Average Cost of Capital**(after tax)=ROC×IC/V =$K_eS/V+K_d(1-T)D/V+K_pP/V$ =$K_eS/V+K_iD/V+K_pP/V$ K_i: after tax cost of debt

Market Value of company(V)=Value of stock S+debt D (+preferred shares P)

ROC×IC=EBIT(1-T) T:tax rate

total amount needed for equity/bond holders: K_eS,K_dD total amount needed to pay bond holders:$K_d(1-T)D$ because Interest is tax deductible.

reflect firm weighted average cost of capital(WACC), compensate for risk of project
k=risk-free rate(R_f)+compensation for risk

Market Value:

①Total MV of firm common Equity/Market Capitalization(S)=market price per share(P_0)×#of shares outstanding(n)

②Total MV of preferred shares=market price of PS(P_P)×n

Market Price for a perpetual preferred shareP=annual preferred dividend D_p/preferred shareholder's required return k_p

③Market Value of a firm debt: $B = I \times \left[\frac{1-1/(1+k)^n}{k}\right] + F \times \left[\frac{1}{(1+k)^n}\right]$

The market value of bonds differs from their book value only if the required rate of return (Yield to Maturity) in the market has changed since the bond's original issue date (i.e if coupon rate ≠ yield to maturity)

Capital Structure: D/V debt E/V equity

※**Issuing/Floatation cost**: costs incurred by a firm when it issues new securities

$Cost\ of\ Debt = \frac{K_d(1-T)}{1-f_d}$ =interest expense/amount of debt

f:floatation cost发行成本 After tax cost of debt=cost of debt×(1-T)

$$Cost\ of\ Preferred\ Equity = \frac{K_P}{1-f_P}$$ (% floatation method) $$Cost\ of\ Common\ Equity = \frac{K_e}{1-f_e}$$

※**Marginal Cost of Capital**(MCC): weighted average cost of the next dollar of financing to be raised. Note: At low levels of financing, MCC=WACC ~~~> MCC>WACC

※**Net Proceeds**(NP): firm receives when issues new bonds, after paying flotation costs

$$NP = I \times (1-T) \times \left[\frac{1-1/(1+k_i)^n}{k_i}\right] + F\left[\frac{1}{(1+k_i)^n}\right]$$

Preferred Share: $k_P = D_p / NP$ (net proceeds method)

Note: dividend are always paid from net income (after tax) thats why只有cost of debt 考虑T

Constant Growth Model

internal equity: Price of Shares P_0 $P_0 = \frac{D_1}{K_e - g}$ $K_e = \frac{D_1}{P_0} + g$ $K_{ne}=D_1/NP+g$

$$K_e = \frac{D_1}{Net\ Proceeds} + g = \frac{D_1}{Sales\ Price - Floatation\ Costs} + b \times ROE$$

$D_1 = X_1(1-b)$ X: expected earnings per share (1-b):dividend payout rate

Capital Asset Pricing Model Risk-Based Model

Security Market Line(SML): Required Return on Equity $K_e = RF + (ER_M - RF)\beta_i$

RF: current risk free rate ER: expected return on stock market

MRP:market risk premium=ER-RF β:CAPM beta of stock

Capital Structure

Leverage:

1.Operating Leverage: Buying (impact cost structure of firm)

+ when capital intensive+ and labor intensive -

replace variable labor costs with fixed costs, increase variability of operating income, improve profitability and also risk if revenue falls.

2.Financial Leverage: Borrowing (effect of using debt as a source of capital)

Note: greater the ratio of funds contributed by creditors (banks, bondholders) as compared to funds contributed by stockholders, the greater a firm's financial leverage.

Gains & Losses:

upside-debt financing is cheaper than equity downside: interest payment on debt are fixed that cant be deferred.

A company can use leverage to try to increase shareholder wealth, but if it fails to do so, the interest expense and risk of default destroy shareholder value.

※ROE: return earned by shareholders on their investment in a company (SE), after they have paid interest on debt

$$ROE = \frac{(EBIT - R_D B)(1-T)}{SE}$$ =Net income/SE

R×B=interest expense=interest cost of debt R×amount of debt/book value of debt B

SE:shareholder Equity
EBIT=Net Earnings+Interests+Taxes=Revenues-Costs from Operations and Assets-Depreciation Expenses
EBITDA=EBIT+ Depreciation Expenses

※ROI (Investment): return on all of the capital provided by investors, both shareholders' equity, and short and long term debt(measures return earned from operations(business risk), no consider how firm financed)

$$ROI = \frac{EBIT(1-T)}{SE+B}$$ EBIT(1-T): earnings after tax but before financing costs

SE+B=book value

Financial Leverage Equation: $$ROE = ROI + (ROI - R_D(1-T))\frac{B}{SE}$$

Business Risk: variability of a firm operating income caused by operational risk
Financial Risk: variability of a firm net income caused by use of FL.
ROI reflects BR, ROE reflects BR&FR.

Tax Benefit
F leverage increased ROE=Additional return earned by common shareholders=ROI-ROE
Tax benefit(F leverage): Interest expenses are tax deductible
Value with debt=Firm value without debt+ corporate tax shield DT
debt+ tax shield+ so WACC-
Coverage ratios show the firm's ability to service debt.

Value of levered firm=value of debt(D)+value of equity(S_L)=value of un-levered firm

Derivatives

※ **Derivative Securities**: securities whose value is contingent/dependent on value of another asset.
Underlying Securities of a derivative: individual stocks,commodities, foreign exchange rates, market indices.
Primary Assets: securities sold by corporation/government to raise capital
①Forwards,Futures期货: oblige two parties to exchange a predetermined quantity of sth at a fixed price sometime in the future.
②Options期权: gives buyer the right to buy and sell a fixed quantity at a predetermined price sometime in the future; seller is obliged to fulfill the contract if called on.
Use of Derivatives:
①**Hedging**: reduce the risk of adverse price movement by taking an offsetting position in a derivative to eliminate exposure to an underlying price.
reduce risk of adverse price movements in an asset,
②**Speculation**: make an educated guess about future value of sth in hopes of profiting from it.
use high risk strategies to profit from anticipated price changes, no exposure to underlying asset,
Derivative Traded:
①Over the Counter (OTC): between banks and big institutions
②Exchange Traded: more retail oriented

1.※ **Forward Contract**: a price established today for future delivery
Spot Contract: for immediate delivery
※Naked Position: leaves investor exposed to changes in the value of underlying asset
※underlying asset:
long: investor owns sth short:investor owes sth
$Profit/Loss\ from\ long\ position=[S_T-F]\times n$ $Profit/Loss\ from\ short\ position=[F-S_T]\times n$
S:future spot price(rate) F:forward price(rate) n:#of contracts entered into
※Credit/Counterparty Risk: a borrower will not fulfill the contract or make a required payment.

※Exposure: extent to which value is affected by an external event (a change in exchange rate)
※**Covering/Hedging**: remove a naked position

Firm has a short/long position in the underlying asset, it should take a long/short position in forward contract.To hedge itself, the cost/proceed=amount×forward rate
②**Interest Rate Parity**(IRP)平价: foreign exchange risk外汇风险

$$\frac{F}{S}=\frac{1+k_{domestic}}{1+k_{foreign}}$$

F: current forward exchange rate期货利率 (number of units of domestic currency required to purchase one unit of foreign currency) S: current spot exchange rate 即期汇率 k:interest rate
Arbitrage (riskless) Profit 套利
③**Pricing Forward Contracts**: investors create a forward position in a storable commodity by buying it spot and holding it for future delivery
※**Commodity**: sth traded based solely on price. (undifferentiated, traded without requiring physical examination)
※**Con-tango** : forward price exceeds spot price
※**storage cost**: price charged for holding a commodity for future delivery

※**Convenience Yield**: benefit/premium derived from holding the asset rather than holding a derivative.
※**Cost of Carry**: total cost of buying a commodity spot and then carrying it or effecting physical delivery when the forward contract expires

$F = (1+c) \times S$ c:cost of carry

2.※ **Futures Contract**: agreement/obligation to buy/sell at a specified price (futures price) and time in the future. (A fixed amount/quality of an underlying asset)

Type of Future:

3.※ **Options Contract**: give buyer right to buy/sell a fixed quantity of underlying asset at a predetermined price sometime in the future

Calls: Buyer has the **right to buy/purchase** the underlying asset at a predetermined price

Puts: Buyer has the **right to sell** the underlying asset at a predetermined price

The seller/writer of option is obliged to fulfill the contracted if called on by buyer.

※Exercise/Strike Price行使价格,敲定价格: price at which option can be converted to underlying asset
※Expiry Date: last date on which you can exercise the option
※intrinsic value: value of option if exercised
※Premium: amount paid for option
※Payoff: proceeds that would be generated from the option if exercised today
※In-the-Money: underlying asset price above strike price for a call(S>X) or below for a put
※Out-Of-the-Money: underlying asset price below strike price for a call or above for a put

$Intrinsic\ Value(call) = Max[S - X, 0]$ S:asset price today X:exercise/strike price

$Option\ Price / Premium = Intrinsic\ Value + Time\ Value$ (underlying asset price may change in the future) At expiration, TV=0

Call Option IV +: underlying asset price+, strick price-, dividend payments of underlying asset-, interest rate +
Call Option TV +: underlying asset riskier, time to expiration+ (put 与之相反)

$Intrinsic\ Value(put) = Max[X - S, 0]$

$P + S = C + PV(X)$ P:put price C:cost of call S:current underlying asset price

continuous compounding: $PV(X) = Xe^{-rt}$ r:risk-free rate per periods t:#of periods(time to expiration of the option)

Black-Scholes Formula: $C = SN[d_1] - Xe^{-rt}N[d_2]$ N[d]:cumulative normal density function

An Investor owns 100 shares($50/share) ① he expects the stock's price to decline: **buy a put option which gives the right to sell the stock at the strike price of $50** ② expects the stock's price unchanged: **sell calls with a strike price of $50, and if the stock price does not change the investor collects the premium on the calls - he would be prepared to deliver/sell his stock if Microsoft's stock price increases above $50.**

Merger & Acquisition

※ **Merger**: 并购company A and company B come together to create a new company, Company A and B cease to exist as separate identifiable entities.
※ **Acquisition**: stock/assets of a corporation(target) end up being owned by another corporation(acquirer).
①Horizontal(remove competition): firms in the same industry combine to achieve economies of scale/scope
②Vertical(integrate): one firm acquires a supplier/downstream client firm to control supply/distribution channels.
③Conglomerate(diversify): a merger in which two firms in unrelated businesses combined to diversify the company.
④Cross-Border(international):a merger/acquisition involving a Canadian and a foreign firm as acquiring/target company.
※ **Hostile Takeover**: An acquirer attempts to buy a target and the management team and/or the board of directors of the target is resisting the takeover attempt.
※ **Amalgamation**:重组 The consolidation of a firm that is controlled by a parent into a single business. Requires a fairness opinion by an independent expert on the true value of the target's shares when a public minority exists.

Synergy Value: $\Delta V = V_{AT} - V_A - V_T$ V_{AT}: value of post merger firm V_A: value of acquiring firm before merger

Takeover Offer
①**Cash Transaction/Deal**: shareholders of target company receive cash in exchange for their shares
Note: Acquirer share price increase if Price<value target+value synergies, decrease if >.
②**Share Transaction**: shareholders of target company receive shares in the acquiring company(bidder) in exchange for their shares. **Total Paid**=offer rate(.. bidder shares per target share)×target company market capitalization
Private Transaction: An acquisition in which the purchaser already owns a majority stake in the target company & "buys out" remaining minority shareholders.

If the price equals the value of target + value of synergies, the shareholders of B get all the benefit

If the price exceeds the value of the target + the value of the synergies

- *All the value of synergies accrues to the former shareholders of B and*
- *The shareholders of A lose something. What they lose accrues to the former shareholders of B.*

Finally, if the price paid is less than the value of B + the value of the synergies

- *Some benefit will accrue to the shareholders of A, but*
- *A disproportionate amount of the value will accrue to the shareholders of B.*

Valuation: target company with comparable firm/industry average

$$Return\ on\ Common\ Stockholders'\ Equity = \frac{Net\ Income(Earnings) - Preferred\ Stock\ Dividends}{Average\ Common\ Stockholders'\ Equity}$$

(+)overall profitability of shareholders investment(how much profit a company generates with the money shareholders have invested) Common shareholders' equity = Total shareholders' equity – Preferred shares

$$Price - Earnings\ Ratio = \frac{Stock\ /\ Market\ Price\ Per\ Share}{Earnings\ Per\ Share}$$

(+: investors expect favourable earnings in future)
relationship between market price per share and earnings per share P.E Ratio

$Dividend\ Yield = \frac{Dividend\ Per\ Share}{Market\ Price\ Per\ Share}$	(+:better for investors seeking income) earnings generated by each share, based on market price per share
$Payout\ Ratio = \frac{Cash\ Dividends\ Declared\ on\ Common\ Stock}{Net\ Income(Earnings)}$	(+:better for investors seeking income) % of earnings distributed in form of cash dividends
$Earnings\ Per\ Share = \frac{Net\ Income - Preferred\ Stock\ Dividends}{Average\ Common\ Shares\ Outstanding}$	(+)net earnings earned on each common share incomparable intercompany, just intracompany

$$Enterprise\ Value = (Equity)\ Market\ Value / Capitalization + Debt\ (Market\ Value) - Cash\ \&\ Cash\ Equivalent$$

※**EV/EBITDA ratio,Enterprise Multiple,EBITDA Multiple**: value of company/business, inclusive of debt and liabilities to actual cash earnings exclusive of non-cash expenses. Lower EV/EBITDA-- undervaluation of a company

1.Can be computed **even for firms that are reporting net losses** since earnings before interest, taxes and depreciation are usually positive.

2.

2.EBITDA is a measure of cash flows from operations so it can be used to compare **firms with different financial leverage in their capital structure**

3.For **firms in certain industries, such as cellular** which require a substantial investment in infrastructure and long gestation periods, this multiple seems to be more appropriate than the price/earnings ratio.

Looks at cash flows prior to capital expenditures, so it may provide a better estimate of "value", especially if the capital expenditures are unwise or earn substandard returns.

Liquidation Valuation: PV(assets),

liquidation value of firm=LV(assets)-V(liabilities)

PV(target firm) = PV(expected future cash flows)

(Target Firm)Free Cash Flow to Equity= net income±non-cash items(amortization,deferred taxes)±changes in net working capital(excluding cash, marketable securities)-net capital expenditures

$$V_0 = \sum_{t=1}^{T} \frac{CF_t}{(1+k)^t} + \frac{V_T}{(1+k)^T}$$

Post-Merger Ratio: total EPS=Total Earnings/Total Shares Outstanding Post Merger